ORIGINAL
FILE

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of

Advanced Television Systems and Their Impact on the Existing Television Broadcast Service	)	MM Docket No. 87-268
	)	RM-5811
	)	
Review of Technical and Operational Requirements: Part 73-E, Television Broadcast Stations	)	
	)	
	)	
Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules	)	
	)	
	)	

COMMENTS OF THE GE CONSUMER ELECTRONICS BUSINESS

November 18, 1987

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FOREWORD

SUMMARY

GE Consumer Electronics Business studies reveal that consumers in the television receiver market, today, want more and better things from their home entertainment experience. The industry has been responding by developing improved performance from the existing NTSC television system standard. However, the NTSC system's built in limitations, including the challenge of attaining a marketable cost effective product, can restrict the degree and number of technically achievable and clearly discernible performance improvements.

In developing a new, Advanced Television (ATV) system it is imperative that a single standard be established. GE CEB strongly favors the well-conceived and practical Advanced Compatible Television (ACTV) system being developed by the David Sarnoff Research Center (DSRC), as truly capturing the beneficial crucial aspects of the ATV concept. As the ATV standard, ACTV would allow for a unified effort by the broadcasters, broadcast equipment manufacturers and TV receiver manufacturers to facilitate consumer education and awareness. The ATV standard based on the ACTV concept would support a broad variety of backward-compatible and forward-compatible new products. Most importantly, such a standard would generate consumer confidence in the viability of the single standard and hasten consumer acceptance of the new service.

Prudent planning is needed to ensure that a standard, like that offered by the ACTV concept, would be developed incorporating sufficient latitude and flexibility to provide for future, as yet undefined performance enhancements. This would result in an ATV system where products could be developed that take advantage of mass

volume manufacturing and the best possible value to the consumer. To ensure that all public interest concerns are met, a strong Commission leadership role in standards setting will be necessary.

In the interest of system compatibility, it is critical that the portion of the RF spectrum currently available for television broadcasting be preserved, and not shared with or re-allocated to any other service. GE CEB strongly recommends against relaxing the present NTSC standard. GE CEB enthusiastically supports the ACTV concept of ATV technologies. ACTV provides the highly desirable and necessary long-range consumer protection for our Nation's television airwaves.

A modification of specific UHF taboos should not be mandated before any new ATV standard is known, and not prior to the acquisition and analysis of new detailed receiver studies aimed at determining the overall impact of any taboo changes on the 130 Million television receivers in U.S. homes. Any resulting Commission mandated taboo changes should only be instituted after establishing a long lead time "grandfather" period, which would help minimize the impact of any performance loss in current TV receiver designs and limit the cost impact on consumers. The Commission is urged to proceed with appropriate caution before instituting changes that could disrupt the Nation's valued Television Broadcast Service.

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COMMENTS OF THE GE CONSUMER ELECTRONICS BUSINESS

INTRODUCTION

The GE Consumer Electronics Business (GE CEB) respectfully submits these comments in response to the Commission's Notice of Inquiry (NOI) in the above entitled proceeding.

GE CEB is the largest color television picture tube and television receiver manufacturer in the United States, marketing both the RCA and GE brands. It also funds the largest video research activity in the U.S. at the David Sarnoff Research Center (DSRC) in Princeton, NJ.

GE Consumer Electronics will soon be strengthened further through its forthcoming acquisition by Thomson S.A., a French corporation with substantial video research capability and a significant market share in Europe, and with a truly world-wide manufacturing capacity. Thomson's own strengths and its forthcoming investment underscore the very substantial, long-term interest that the GE Consumer Electronics organization has in the future of television service in the United States.

Through this proceeding, the Commission has responded to a Petition for Notice of Inquiry, filed on February 13, 1987 by the Association of Maximum Telecasters and 57 other broadcast organizations and companies, seeking the initiation of a proceeding to explore the issues surrounding the introduction of new television technologies designed to significantly improve the quality of television picture and sound.

The instant NOI on Advanced Television (ATV) Systems will impact the future of television service in the U.S. for decades to come. This proceeding comes at a crucial period in the growth of the television

service marketplace, in which GE CEB's longstanding commitment and active participation are well recognized. Therefore, GE CEB's interest in the outcome of this proceeding is well established.

DISCUSSION

GE CEB's concerns in connection with this NOI are significant and go to the heart of the ATV and UHF taboo issues. By these comments, GE CEB will analyze and discuss the following critical points:

- Basic technology for improved quality television in the U.S. is generally available.
- Consumers have demonstrated a general desire for improved quality in consumer products and thus will expect ATV.
- The most desired improvements in TV are aspect ratio and picture resolution.
- Compatibility of new ATV systems with existing NTSC consumer products is vital.
- New ATV system should be deliverable by all present media -- terrestrial broadcast, cable, VCR and DBS.
- Terrestrial broadcast, cable and VCR are fundamental delivery systems that must be fully supported and preserved with the most advanced TV system.

- Consumer acceptance of new consumer electronics products requires that the benefits be readily discernible, and that the products be cost effective and readily available.

- Cost effectiveness of consumer products is very dependent on mass production and distribution, and multimedia delivery of fully compatible ATV signals is the only route to broad consumer product acceptance, and the economies of mass production and distribution.

- Most desirable and practical is the two-phase system approach as proposed by the David Sarnoff Research Center (DSRC), starting with 6 MHz ACTV to gain first-order aspect ratio and some resolution improvements, near term, followed by a 9 MHz or 12 MHz system with further high definition capabilities.

- Additional TV spectrum for high definition ATV can probably be created by modification of UHF taboos.

- Acquiring additional spectrum from UHF taboos, and economical large screen high definition displays will require a number of years of development.

- UHF taboo studies should be mandated by the scope of the proceeding, and must include extensive broadcast and receiver tests with new taboo-reduced tuners, including NTSC and newly defined UHF-TV spectrum ATV system broadcasts.

- Taboo changes in UHF broadcast would have to be delayed approximately ten years after taboo-reduced tuner

equipped receivers were introduced to the marketplace.

- NTSC standards must not be relaxed. NTSC and ATV systems specifications must be clearly defined. Forward- and backward-compatibility, as offered by the DSRC ACTV system, would ensure compliance with this public interest mandate.

- Terrestrial broadcast TV is fundamental to the U.S. society. Reservation of spectrum made available from reduction of UHF taboos for continued ATV is a most important priority. Over time, essentially, every U.S. household will benefit.

- Because of the importance of terrestrial broadcasting and the severe scarcity of TV broadcast spectrum, a marketplace solution to ATV is not possible.

- Strong FCC leadership in conjunction with the industry is required.

Today's consumer is demanding more and more from his home entertainment system. He wants bigger and better pictures, bigger and better sound, a larger and more diverse choice of services. The consumer is really saying that he wants a bigger and better entertainment experience.

Within the limits of the existing NTSC system, the industry is attempting to respond to these consumer desires. The ever improving

performance level of home video and audio devices, as well as the additional video services available in the marketplace at popular prices, are providing the consumer an increasing level of satisfaction. At the same time these advances are causing a continuing expansion of consumer expectations.

Products like Television Multichannel Sound, Super-VHS VCR's, VideoDisc players, Hi-fi VCR's, Compact Disc players, Surround Sound Processors, computers and higher resolution monitor/receivers have been responsible for setting new performance reference points that emphasize, for the consumer, the potential for even greater performance advancements in the future.

When such performance improvements are combined with the new generation of very large screen TV receivers, the viewer can become immersed in a viewing experience that begins to rival that of a movie theater. Numerous research studies show that this kind of experience is what the consumer wants.

TV receiver manufacturers have attempted to satisfy consumer desires for the larger, "all encompassing" image that can be found in movie theaters, with a succession of large screen direct view and projection TV sets. But the limitations of the NTSC broadcast signal displayed on those screens become more and more apparent as the screen size increases.

The performance problems are well documented: limited resolution, cross-color and crawling/hanging dot artifacts, etc. Although they tend not to be as noticeable on smaller screen sets, when displayed on the new generation of large screen models, these limitations can become annoying to the viewer.

The current 4 x 3 aspect ratio is perceived as an additional limitation by consumers. Wide screen movies made for the theater must be cut, edited, chopped and processed, sometimes unnaturally, in order to fit onto the home video screen.

The consumer, through his purchase of innovative higher performance products, is clearly telling the industry (manufacturers and broadcasters) that improved video performance is needed. The question that the industry must address is: how do you attain that improvement?

One approach, of course, would be to continue refining and improving receivers that utilize the current NTSC television broadcast standard. However, the enhancements resulting from such an approach can be subtle and less than obvious to the consumer, despite significant industry investment in developing product improvements. The end result is that product costs increase, significantly, while the benefit to the consumer becomes marginal.

We'll respond to the questions raised by this dilemma, including:

-What are the improvements that should be incorporated?
-How should those improvements be attained?
-How costly must that improvement be?

-Certain Improvements Should Be Incorporated.

Probably the most obvious change that can be made is to widen the aspect ratio of the screen. It produces an immediately noticeable difference, provides a more lifelike viewing experience, and makes the benefits of a new system immediately obvious.

To obtain more lifelike pictures on a widened screen, improved overall video performance via enhanced resolution, a reduction of the NTSC artifacts and a reduced line structure are required.

Improved sound is also important. Wider dynamic range, reduced distortion, reduced background noise, and better frequency response would clearly be preferred.

The consumer has also indicated an interest in receiving additional services beyond entertainment such as news, information, education, home shopping, etc., all of which increase the functionality of the TV

receiver. The relative success of the home shopping services as well as regional successes of Teletext services offer further evidence of that desire.

-Improvements Should Be Attained Cautiously, And Without Detracting From Existing Television Service.

It is apparent that any significant change in the quality of broadcast signals could require a fundamental change in the broadcast format. However, one must recognize the existing population of TV equipment represents a substantial consumer investment that should not be obsoleted overnight. Consequently, future system planning must provide for an orderly, easy and economical transition from the existing standard to whichever new standard might be developed.

In developing a new system it is imperative that a single standard be established for the service. This allows for a unified effort by the broadcasters, broadcast equipment manufacturers and TV receiver manufacturers to facilitate consumer education and awareness. The industry would support any new standard with a broad variety of compatible products. Most importantly, such a standard would generate consumer confidence in the viability of the single standard. Inherently, this approach should lead to hastened consumer acceptance of the new service.

Failure of the industry to select a single standard could cause significant confusion among all parties. The result could be consumer hesitancy in making the leap to an advanced system, broadcaster reluctance to invest early in a new technology, or television receiver manufacturer indecision about which of the system technologies to adopt. Any of these scenarios could reduce the rate of system adoption by broadcasters, or perhaps even result in outright consumer rejection. Without a single industry adopted ATV standard, the consumer would ultimately be the loser.

Typically, attempts to anticipate long term future requirements of any complex technology are underscoped. However, prudent planning should ensure that a standard would be developed that has sufficient latitude and flexibility to provide for future, as yet undefined performance enhancements.

-The Cost Of TV System Improvements Can Be Controlled.

The history of the consumer electronics business confirms that consumers are willing to pay for noticeable improvements, but will not pay what they consider an unreasonable amount for the benefit received. When the price is too high, the consumer often elects either to reject the product outright, or else wait on the sidelines until the market price for the new technology is perceived to be more realistic.

The ability of the consumer electronics industry to build upon existing technology, and its processes, while targeting a single standard allows needed investment resource focussing for the development of the most cost-effective design possible. This results in products that take advantage of mass volume manufacturing and become the best possible value to the consumer.

SPECIFIC COMMENTS

The David Sarnoff Research Center (DSRC) is submitting Comments on this NOI that provide an excellent understanding of the current state of video technology, the possibilities and the challenges of moving to high definition television in the U.S., and the significant issues associated with changing to a second standard from the NTSC standard. GE CEB's consideration of the DSRC Advanced Compatible Television (ACTV) system confirms that ACTV responds, in practical and desirable terms, to the needs of the consumer as expressed in the marketplace. GE CEB strongly endorses the DSRC comments addressing the issues raised by the NOI, and concurs with the DSRC responses to the specific questions set forth in this proceeding.

In addition to the expansive DSRC comments, it is important to underscore several major points, which are highlighted as follows:

Preservation of Spectrum.

While significant advances can be made in television systems utilizing 6 MHz per channel, in the long term view for advanced television systems, additional bandwidth will be required for each terrestrial broadcaster desiring to provide ATV service. It is therefore critical that the portion of the spectrum currently available for television broadcasting be preserved, and not shared with or re-allocated to any other service.

Television currently serves roughly 90,000,000 American households. On political and cultural issues it is the Nation's primary means of communication, and it has served the country well over the past four decades. The future of America's core television service must not be jeopardized by the loss of radio frequency spectrum.

Commission Leadership.

Without standards, any move to an advanced television system will be exceedingly difficult and the eventual success of such endeavor doubtful. The available spectrum is too limited to permit the full play of market forces. A marketplace totally free of such limiting influences would be needed if the Commission were to rely upon only one such road marker for guidance in determining what the new U.S.

ATV system standard ought to be.

The economics of any conversion to a new television system standard would make change difficult. The concomitant risks attendant with any significant change in television broadcast standards could be very high. For instance, broadcasters could be hesitant to experiment with new systems because of the highly speculative investments required. In addition, the consumer electronics industry has become so competitive that even a small added cost, for special circuitry in TVs that are mass-produced, can place the receiver manufacturer at a significant competitive disadvantage. TV receivers that are not mass-produced could be prohibitively expensive.

An ATV system that offers television viewers backward- and forward-compatibility with present television receivers is most desirable for the protection of the public interest. The DSRC ACTV system as the ATV standard would readily achieve this important public interest goal.

The difficulties faced by industry in the past during the introduction of FM 4-channel audio and AM stereo would be minor compared to the economic barriers to a change in the U.S. television system standard. Clearly, as was the case in the formulation of standards for the Television Multichannel Sound system, the Commission must recognize the need for, and invoke its leadership role in fulfilling its

public interest responsibility. In this instance, such responsibility calls for a single ATV System standard.

Relaxation of the NTSC Standard.

The unintended and unanticipated consequences of relaxing the NTSC standard, or making adherence to the NTSC standard voluntary, could be a very serious concern and a major public interest issue.

Save for an ongoing NTSC system compatibility, Television receiver designers would be unable to anticipate the conditions under which receivers intended only for NTSC technical parameters will be required to perform. Furthermore, designs embodied in integrated circuits include a lead time approaching two years - long before a TV receiver design actually reaches the consumer marketplace. It is virtually impossible to respond to unanticipated circuit redesign needs in a timely manner.

If poor picture performance or other problems were to arise as a result of a relaxation of the NTSC standard, consumers are likely to blame their TV receiver, the dealer, and the manufacturer, neither of which are at fault, nor in a position to respond satisfactorily. Recalling the CB fiasco, Consumers would also flood the Commission with complaints.

The consequences of changing or deviating from the NTSC standard may be even more pernicious if, due to fortuity and quirks of design, problems occur in one brand of TV receiver, and not another. Such an event would severely penalize a manufacturer in the marketplace, after that manufacturer had made a very substantive investment in a design it had every reason to believe was sound. Likewise, the cost to the consumer in lost, or deteriorated, TV reception due to incompatible NTSC signals causing interference must be recognized. The conditions under which such unwarranted incursions could affect the Nation's standard NTSC-based television system must be scrupulously avoided.

GE CEB strongly recommends against any relaxation of the NTSC standard by the Commission. Any deviation to another television system using ATV technologies must afford adequate long range protection to our Nation's television airwaves. The DSRC ACTV system is designed to achieve this highly desirable goal.

The UHF Taboos

There appears to be an opportunity to obtain more RF spectrum space through the reduction of the UHF taboos. However, a very careful study, weighing the specific benefits against the negative effects must be undertaken before the taboos can be modified.

Advances have been made in television tuner design, including such improvements as reduced radiated emissions and improved interfering non-TV broadcast signal rejection. However, today's TV receiver designs continue to depend upon the taboos to protect against unacceptable interference between UHF-TV broadcast transmissions.

There is insufficient information, currently extant, that would enable TV receiver manufacturers to clearly understand and confirm the loss in performance, within the existing receiver population, if a specific taboo were to be modified. For instance, the performance loss would be different, depending on the alternative use chosen for the re-allocated spectrum space. An accurate evaluation would be needed regarding the character and magnitude of the performance impact of specific taboo changes on existing receivers, before modifying the taboos.

A clear understanding of the benefits and burdens obtained by modifying specific taboos is necessary in order to make the appropriate performance versus cost decisions. Such benefits, if achievable, cannot be defined unless and until the alternative uses of the target RF spectrum are known. It would be premature to establish new receiver oriented requirements intending to maximize spectrum usage, until the character of the transmission and RF spectrum parameters of a new ATV System standard have been established.

Technology exists that could allow future TV receiver designs to significantly reduce the UHF taboo requirements. Nonetheless, a protected first IF frequency would be required that recognizes that the receiver must be able to tune all off air and cable TV channels.

The development and implementation of such performance improved designs, using technology available today, could represent a cost increase to the receiver manufacturer of from $20 to $40, or more, per unit. The added purchase cost to the consumer and the concomitant dislocations of the TV receiver marketplace could have a severely detrimental impact on the industry. Therefore, these added costs to the consumer should be judged as justified, only if an industry wide change were found necessary after a strong showing of public need, and such change were mandated by the Commission.

RESPONSES TO SPECIFIC NOI QUESTIONS

16. The present taboos were adopted in 1952 and have remained unchanged since that time. What taboos should be eliminated or modified and what impact would this have on existing television service?

GE CEB believes that the basic reasons that initially produced the necessity for the development of the UHF taboos still exist, today. The one exception is the n+7 oscillator requirement. However, concern about the IF beat caused by the n+7 sound carrier will require some protection, similar to the n+8 IF beat protection of 19.5 miles.

17. In reevaluating the effect of taboos generally, what percentage of viewers should be protected?

GE CEB believes that, considering the total population of receivers, in a given problem area 90% of the viewers should be protected. Also, some corrective measures should be developed and made available to the remaining 10% of the viewers that are unprotected.

18. Are the conclusions concerning the "VHF reference" criteria described in this proceeding justified? Should the taboos be modified as suggested in this proceeding?

GE CEB endorses the commentary response to this question by EIA Consumer Electronics Group, prepared for filing in this proceeding, in that, comparisons should be made using the lower decile of VHF performance versus the lower decile of UHF performance, not using the median performance. The data presented in FCC/OET TM-1 shows the performance spread of VHF cross modulation from median to lower decile is much less than many UHF performance spreads from median to lower decile. Matching median values does not infer a matching of the lowest decile performance.

Further, it cannot be assumed that an absence of complaints means acceptable VHF performance. There is a telling need for a more complete study of the actual problems. To obtain statistically significant data on lowest decile performance

requires sampling much more product, from a broader selection of manufacturers, a wider variety of designs, and for both new and old (aged 0-10 years) product.

In general, the "VHF reference" criteria used does not provide an accurate evaluation of the possible problems that would be encountered through a relaxation of specific taboos. An approach that directly relates taboo relaxation to the potential problems would be preferred.

Significant modification of the UHF taboos for NTSC should be done only if justified by new, up to date, information coming from a more comprehensive and accurate study of receiver performance and field conditions than has been done to date. The studies now on the record fail to take into account enough critical factors to justify a significant relaxation of the taboos.

Because the conclusions are not justified by the record, the taboos should not be modified as suggested in the NOI.

19. Because of the taboos, only 9 (at most) UHF channels can be assigned to any given city.

a. To what extent could broadcasters take advantage of the "gaps" in the allocation table to transmit auxiliary information for advanced TV systems?

With proper attention to avoiding interference with existing

system transmissions, the "gaps" in the current allocation table could represent an opportunity for future use by new ATV systems.

b. Should new assignments made possible by elimination or modification of taboos be reserved for advanced TV system use, opened for licensing to new full service stations, or used for other purposes?

The most important criterion for use of the new assignments should be the attainment of a minimum negative effect on existing services. New full power NTSC TV broadcast stations would have a known detrimental effect. Use of such assignments by an advanced TV system could and should be most advantageously defined to have a minimal negative effect on others occupying the spectrum.

20.a. How might future improvements in television receivers affect susceptibility to taboo frequencies?

Future receiver improvements, such as published by Texas Instruments and RF Monolithics must consider the need to tune all VHF, UHF and cable channels. Agreement will be needed on a protected first IF frequency. Presently, this can only be done at a significant cost premium.

The consumer would not perceive that there had been an improvement unless a problem exists. Therefore, this change cannot be justified based on normal market forces.

A major improvement for intermodulation, cross modulation or adjacent channel problems would be difficult. Cost effective high performance circuit devices do not presently exist.

b. Are advanced TV signals (including any auxiliary signals or augmentation channels) likely to be more, or less, susceptible to current taboo frequencies? Will new taboo frequencies arise?

Auxiliary signals for advanced TV systems are less likely to be susceptible to current taboo frequencies. System designers must work to avoid any known interference problems. If the "main" signal is an enhanced NTSC-type signal it should be just as susceptible to taboo frequencies as present NTSC signals.

The need for new taboos can be averted by appropriately designed ATV signals that provide much more information, through the judicious choice of carrier and modulation, combined with the inherently advantageous collocation of the "main" (NTSC-like) signal with any enhancements. Collocation offers significant benefits to ATV spectrum use compared to any other service in the band, because it avoids creating adverse undesired-to-desired signal level ratios.

c. Are changes in receiver design likely to cost effectively reduce the susceptibility of receivers to taboo frequencies for NTSC signals?

Television receiver designers would certainly consider the